

Report from the Airplane Performance Harmonization Working Group

Issue: Landing on Contaminated Runways

Rule Section: FAR 121.195, 135.385 / JAR-OPS 1.520

1 - What is underlying safety issue to be addressed by the FAR/JAR? [Explain the underlying safety rationale for the requirement. Why should the requirement exist? What prompted this rulemaking activity (e.g., new technology, service history, etc.)?]

It is fundamental to operational safety that the airplane must be able to land and stop in the available distance upon arrival at the airport of intended landing. The landing distance standards ensure that the airplane is taken off at a weight that would allow a safe landing at both the destination and alternate airports. The standards take into account the conditions at the destination and alternate airports, and must allow for differences between the conditions existing or forecast at the time of takeoff and the conditions at the time of landing. Since the time of takeoff may be considerably different from the time the airplane actually lands, the standards are conservative. For dry runways, the available landing distance must be 67% more than the demonstrated dry landing distance shown in the Approved Airplane Flight Manual (AFM), and for wet runways, the available landing distance must be 92% more.

2 - What are the current FAR and JAR standards relative to this subject? [Reproduce the FAR and JAR rules text as indicated below.]

Current FAR text:

Part 121

FAR 121.195 Airplanes: Turbine Engine Powered: Landing Limitations: Destination Airports

- (d) Unless, based on a showing of actual operating landing techniques on wet runways, a shorter landing distance (but never less than that required by paragraph (b) of this section) has been approved for a specific type and model airplane and included in the Airplane Flight Manual, no person may take off a turbojet powered airplane when the appropriate weather reports and forecasts, or a combination thereof, indicate that the runways at the destination airport may be wet or slippery at the estimated time of arrival unless the effective runway length at the destination airport is at least 115 percent of the runway length required under paragraph (b) of this section.

Part 135

FAR 135.385 Large Transport Category Airplanes: Turbine Engine Powered: Landing Limitations: Destination Airports

- (d) Unless, based on a showing of actual operating landing techniques on wet runways, a shorter landing distance (but never less than that required by paragraph (b) of this section) has been approved for a specific type and model airplane and included in the Airplane Flight Manual, no person may take off a turbojet powered airplane when the appropriate weather reports and forecasts, or a combination thereof, indicate that the runways at the destination airport may be wet or slippery at the estimated time of arrival unless the effective runway length at the destination airport is at least 115 percent of the runway length required under paragraph (b) of this section.

Current JAR text:

JAR-OPS 1.520 Landing – Wet and Contaminated Runways

- (a) An operator shall ensure that when the appropriate weather reports or forecasts, or a combination thereof, indicate that the runway at the estimated time of arrival may be wet, the landing distance available is at least 115% of the required landing distance, determined in accordance with JAR-OPS 1.515.
- (b) An operator shall ensure that when the appropriate weather reports or forecasts, or a combination thereof, indicate that the runway at the estimated time of arrival may be contaminated, the landing distance available must be at least the landing distance determined in accordance with subparagraph (a) above, or at least 115% of the landing distance determined in accordance with approved contaminated landing distance data or equivalent, accepted by the Authority, whichever is greater.
- (c) A landing distance on a wet runway shorter than that required by subparagraph (a) above, but not less than that required by JAR-OPS 1.515(a), may be used if the Aeroplane Flight Manual includes specific additional information about landing distances on wet runways.
- (d) A landing distance on a specially prepared contaminated runway shorter than that required by subparagraph (b) above, but not less than that required by JAR-OPS 1.515(a), may be used if the

Aeroplane Flight Manual includes specific additional information about landing distances on contaminated runways.

When showing compliance with subparagraphs (b), (c) and (d) above, the criteria of JAR-OPS 1.515 shall be applied accordingly except that JAR-OPS 1.515(a)(1) and (2) shall not be applied to subparagraph (b) above.

2a – If no FAR or JAR standard exists, what means have been used to ensure this safety issue is addressed? [Reproduce text from issue papers, special conditions, policy, certification action items, etc., that have been used relative to this issue]

N/A

3 - What are the differences in the FAA and JAA standards or policy and what do these differences result in? [Explain the differences in the standards or policy, and what these differences result in relative to (as applicable) design features/capability, safety margins, cost, stringency, etc.]

FAR 121.195(d), FAR 135.385(d) and JAR-OPS 1.520(a) are similar as far as wet runways are concerned. Each requires that the available landing distance be 115% of that required for dry runways unless a shorter distance (but not less than that for dry runways) is provided in the AFM. They differ in that the FARs require the shorter distance to be based on a showing of actual operating landing techniques on wet runways and provided in the AFM, whereas the JAR requires only that the shorter distances be provided in the AFM. This does not result in any differences in safety margins.

FAR 121.195(d) and FAR 135.385(d) do not specifically address contaminated runways, but rather slippery runways, and do not require any additional landing distance over that for wet runways. JAR-OPS 1.520(b) requires that the available landing distance on contaminated runways be the greater of that required for wet runways or 115% of that determined in accordance with approved contaminated landing distance data or equivalent. (The 67% conservative factor does not apply to contaminated runway landing distances.) Except for the most slippery runway conditions, which are rarely encountered, the wet landing distance requirements are generally longer than 115% of the contaminated landing distances; therefore, there is no appreciable difference in safety margins between the rules.

JAR-OPS 1.520(d) allows operators to use landing distances appropriate for specially prepared contaminated runways if they are provided in the AFM. This paragraph was introduced to account for the special runway surface conditions sometimes employed in Northern European countries, such as Scandinavia, that are sanded to improve their friction characteristics when contaminated with packed snow or ice, etc. There is no similar provision in the FARs.

4 - What, if any, are the differences in the current means of compliance? [Provide a brief explanation of any differences in the current compliance criteria or methodology (e.g., issue papers),

including any differences in either criteria, methodology, or application that result in a difference in stringency between the standards.]

The differences in the means of compliance are due to the differences in the standards. Where the standards are the same (i.e. application of wet runway limits), the means of compliance are the same.

5 – What is the proposed action? [Describe the new proposed requirement, or the proposed change to the existing requirement, as applicable. Is the proposed action to introduce a new standard, or to take some other action? Explain what action is being proposed (not the regulatory text, but the underlying rationale) and why that direction was chosen for each proposed action.]

The Working Group proposes to harmonize to the FAR requirements. This means that the requirement to consider specific runway contamination conditions at the time of dispatch would be removed from JAR-OPS 1.

The landing distance standards apply at the time of takeoff because there is generally no practical way to significantly reduce weight once the airplane arrives at the airport of intended landing. Certainly there is no way to reduce payload once the airplane has taken off. Fuel jettisoning is not intended to be used for this purpose and, in fact, may not be possible if the airplane is not equipped with a fuel jettisoning system. Consumption of excess fuel is both wasteful and time consuming. The normal method of complying with the landing standards is to determine the maximum weight that satisfies all of the landing requirements and add the expected en-route fuel consumption to arrive at a limiting takeoff weight. The landing standards are commonly referred to as dispatch requirements.

The Working Group discussed the practical problems with a dispatch rule requiring consideration of actual runway condition. Currently, operators comply with dispatch landing requirements on the basis of the best available weather reports and/or forecasts. The operator often does not know the specific runway conditions that will exist when the airplane arrives at the airport of intended landing. This is especially true for long flights where many hours may pass between the time of dispatch and the time of arrival. Thus, the operator may base the dispatch weight on a report or forecast indicating that the runways may be contaminated only to find the runways clear when the airplane actually arrives. An unnecessary payload reduction could result. The reverse situation, in which the dispatch weight is based on dry runways but the runways are actually contaminated upon arrival, is addressed by FAR 121.551/553/601/603 and JAR-OPS 1.400. These sections, which are reproduced below, require that the dispatcher notify the pilot of any changes in conditions that could affect the safety of the flight and that the operator restrict or suspend operations if hazardous conditions exist (in the case of the FARs) or that the pilot is assured that a safe landing can be made (in the case of JAR-OPS).

FAR 121.551 Restriction or suspension of operation: Domestic and flag operations.

When a certificate holder conducting domestic or flag operations knows of conditions, including airport and runway conditions, that are a hazard to safe operations, it shall restrict or suspend operations until those conditions are corrected.

FAR 121.553 Restriction or suspension of operation: Supplemental operations.

When a certificate holder conducting supplemental operations or pilot in command knows of conditions, including airport and runway conditions, that are a hazard to safe operations, the certificate holder or pilot in command, as the case may be, shall restrict or suspend operations until those conditions are corrected.

FAR 121.601 Aircraft dispatcher information to pilot in command: Domestic and flag operations.

(c) During a flight, the aircraft dispatcher shall provide the pilot in command any additional available information of meteorological conditions (including, adverse weather phenomena, such as clear air turbulence, thunderstorms, and low altitude wind shear), and irregularities of facilities and services that may affect the safety of the flight.

FAR 121.603 Facilities and services: Supplemental operations.

(b) During a flight, the pilot in command shall obtain any additional available information of meteorological conditions and irregularities of facilities and services that may affect the safety of the flight.

JAR-OPS 1.400 Approach and Landing Conditions

Before commencing an approach to land, the commander must satisfy himself that, according to the information available to him, the weather at the aerodrome and the condition of the runway intended to be used should not prevent a safe approach, landing or missed approach, having regard to the performance information contained in the Operations Manual.

For the JAA, this agreement was contingent on the modification of JAR-OPS 1.400. The JAA wants to retain the 115% conservatism for contaminated runway landing distances and, therefore, requires that JAR-OPS 1.400 refer to this factor.

The following proposal for JAR-OPS 1.400 was drafted by the JAA Performance Subcommittee and will be sent to the JAA OPS Procedures Study Group.

**JAR-OPS 1.400 Approach and Landing Conditions
(See IEM OPS 1.400)**

(a) Before commencing an approach to land, the commander must satisfy himself that, according to the information to him, including the weather at the aerodrome, the condition of the runway intended to be used, and considering any inflight failures of systems which affect the landing distance should not prevent a safe approach, landing or missed approach, having regard to the performance information contained in the Operations Manual.

(b) If the condition of the runway intended to be used for landing is contaminated, the landing distance must be at least the landing distance determined in accordance with JAR-OPS 1.520(a), or at least 115% of the landing distance determined in accordance with approved contaminated landing distance data or equivalent, accepted by the Authority, whichever is greater.

(c) If the aeroplane was dispatched in accordance with JAR-OPS 1.515(d), the commander must, in addition, satisfy himself before commencing an approach to land at the destination aerodrome that a landing can be made in full compliance with JAR-OPS 1.510 and JAR-OPS 1.515(a) and (b).

The Working Group also discussed the practical aspects of the FAR requirement that any wet runway landing distances less than 115% of those required for dry runways must be based on a showing of actual landing techniques on wet runways. This essentially requires an operator to know the basis for data provided in the AFM, something operators do not generally know. This requirement was placed in the operating regulations because it does not appear in the airworthiness regulations. The Working Group proposes to remove this requirement from FAR 121.195/135.385 and place a requirement in FAR/JAR Part 25 to address the issue.

6 - What should the harmonized standard be? [Insert the proposed text of the harmonized standard here]

Part 121

**FAR 121.195 Airplanes: Turbine Engine Powered: Landing
Limitations: Destination Airports**

- (e) No person may take off a turbine engine powered airplane when the appropriate weather reports and forecasts, or a combination thereof, indicate that the runways at the destination airport may not be dry at the estimated time of arrival unless the landing distance available at the destination airport is at least 115 percent of the runway length required under paragraph (b) of this section.
- (f) A landing distance on a wet runway with a landing distance available shorter than that required by paragraph (f) of this section, but not less than that required by paragraph (b) of this section, may be used if a shorter wet runway landing distance has been approved for a specific type and model airplane and included in the Airplane Flight Manual.

Part 135

FAR 135.385 Large Transport Category Airplanes: Turbine Engine Powered: Landing Limitations: Destination Airports

- (e) No person may take off a turbine engine powered airplane when the appropriate weather reports and forecasts, or a combination thereof, indicate that the runways at the destination airport may not be dry at the estimated time of arrival unless the landing distance available at the destination airport is at least 115 percent of the runway length required under paragraph (b) of this section.
- (f) A landing distance on a wet runway with a landing distance available shorter than that required by paragraph (f) of this section, but not less than that required by paragraph (b) of this section, may be used if a shorter wet runway landing distance has been approved for a specific type and model airplane and included in the Airplane Flight Manual.

JAR-OPS 1.520 Landing – Wet and Contaminated Runways

- (a) An operator shall ensure that when the appropriate weather reports or forecasts, or a combination thereof, indicate that the runway at the estimated time of arrival may be wet or contaminated, the landing distance available is at least 115% of the required landing distance, determined in accordance with JAR-OPS 1.515.
- (b) A landing distance on a wet or specially prepared runway shorter than that required by subparagraph (a) above, but not less than that

required by JAR-OPS 1.515(a), may be used if the Aeroplane Flight Manual includes specific additional information about landing distances on wet runways.

Summary of Changes:

(1) Redesignate §§ 121.195(d) and 135.385(d) as §§ 121.195(e) and 135.385(e). This is required because of the addition of §§ 121.195(c) and 135.385(c), which were added to align the FAR and JAR.

(2) Amend newly designated §§ 121.195(e) and FAR 135.385(e) to remove the words “Unless, based on a showing of actual operating landing techniques on wet runways, a shorter landing distance (but never less than that required by paragraph (b) of this section) has been approved for a specific type and model airplane and included in the Airplane Flight Manual.” This would remove the requirement for the airplane operator to know the certification basis for data contained in the AFM. A requirement to base shorter wet runway landing distances on actual landing techniques should be added to FAR Part 25.

(3) Amend newly designated §§ 121.195(e) and 135.385(e) to replace the words “wet or slippery” with “not dry.” Since damp runways are to be treated as wet, this brings the landing standards into alignment with the revised definitions of runway conditions in FAR 121.171.

(4) Add a new paragraph, FAR 121.195(f), allowing the use of wet runway landing distances shorter than 115% of dry runway landing distances, provided the data are contained in the AFM. This section aligns the FAR and JAR and provides essentially the same provisions as the wording removed in item (2) above.

(5) Delete JAR-OPS 1.520(b) and (d) and the paragraph following (d). Redesignate JAR-OPS 1.520(c) as JAR-OPS 1.520(b). This would harmonize with the FAR by requiring runways to be addressed only as “dry” or “not dry” at the time of dispatch.

(6) Add “or specially prepared” to the requirements of JAR-OPS 1.520(b). This is required because of the deletion of JAR-OPS 1.520(d).

7 - How does this proposed standard address the underlying safety issue (identified under #1)? [Explain how the proposed standard ensures that the underlying safety issue is taken care of.]

For the FAA, the underlying safety issue will be addressed in the same manner as it is currently.

For the JAA, the underlying safety issue is addressed by strengthening the standard requiring the pilot to assure himself that a safe landing can be made.

8 - Relative to the current FAR, does the proposed standard increase, decrease, or maintain the same level of safety? Explain. [Explain how each element of the proposed change to the standards affects the level of safety relative to the current FAR. It is possible that some portions of the proposal may reduce the level of safety even though the proposal as a whole may increase the level of safety.]

The proposed FAA standard maintains the same level of safety.

9 - Relative to current industry practice, does the proposed standard increase, decrease, or maintain the same level of safety? Explain. [Since industry practice may be different than what is required by the FAR (e.g., general industry practice may be more restrictive), explain how each element of the proposed change to the standards affects the level of safety relative to current industry practice. Explain whether current industry practice is in compliance with the proposed standard.]

The proposed FAA standard maintains the same level of safety.

10 - What other options have been considered and why were they not selected? [Explain what other options were considered, and why they were not selected (e.g., cost/benefit, unacceptable decrease in the level of safety, lack of consensus, etc.) Include the pros and cons associated with each alternative.]

The Working Group easily reached consensus on this issue and did not consider any other options.

11 - Who would be affected by the proposed change? [Identify the parties that would be materially affected by the rule change – airplane manufacturers, airplane operators, etc.]

No one is expected to be adversely affected by the proposed change.

12 - To ensure harmonization, what current advisory material (e.g., ACJ, AMJ, AC, policy letters) needs to be included in the rule text or preamble? [Does any existing advisory material include substantive requirements that should be contained in the regulation? This may occur because the regulation itself is vague, or if the advisory material is interpreted as providing the only acceptable means of compliance.]

N/A

13 - Is existing FAA advisory material adequate? If not, what advisory material should be adopted? [Indicate whether the existing advisory material (if any) is adequate. If the current advisory material is not adequate, indicate whether the existing material should be revised, or new material provided. Also, either insert the text of the proposed advisory material here, or summarize the information it will contain, and indicate what form it will be in (e.g., Advisory Circular, policy, Order, etc.)]

N/A

14 - How does the proposed standard compare to the current ICAO standard? [Indicate whether the proposed standard complies with or does not comply with the applicable ICAO standards (if any)]

The proposed standard is in compliance with the relevant ICAO standards for the “Operation of Aircraft” (Annex 6)

15. – Does the proposed standard affect other HWG’s? [Indicate whether the proposed standard should be reviewed by other harmonization working groups and why.]

No.

16 - What is the cost impact of complying with the proposed standard? [Please provide information that will assist in estimating the change in cost (either positive or negative) of the proposed rule. For example, if new tests or designs are required, what is known with respect to the testing or engineering costs? If new equipment is required, what can be reported relative to purchase, installation, and maintenance costs? In contrast, if the proposed rule relieves industry of testing or other costs, please provide any known estimate of costs.]

There is no cost impact associated with the proposed standard.

17. - If advisory or interpretive material is to be submitted, document the advisory or interpretive guidelines. If disagreement exists, document the disagreement.

N/A

18. – Does the HWG wish to answer any supplementary questions specific to this project? [If the HWG can think of customized questions or concerns relevant to this project, please present the questions and the HWG answers and comments here.]

No.

19. – Does the HWG want to review the draft NPRM prior to publication in the Federal Register?

Yes.